



The impacts of PTA formation on small economies' tax competition for FDI inflows[☆]

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ABSTRACT

This paper examines why small economies are so eager to form or join preferential trade agreements (PTAs), as observed in the East Asia and the Central Europe, taking consideration of the strategic impacts of PTA formation on tax competition for foreign direct investment (FDI) inflows. Based on a simple model where three asymmetric countries compete for FDI inflows, we demonstrate that PTA formation provides a strategic advantage to a small member country of PTA in competing for FDI inflows not only with respect to a non-member country but with a large member country when the integrated market size is large enough. In addition, it is shown that it might be an out-of-equilibrium path strategy for a non-member small economy to exert efforts to induce FDI inflows, because the excessive subsidies to induce FDI inflows might outweigh the gains from the FDI inflows due to strategic disadvantage in tax competition after PTA formation. These findings explain why small economies are mainly driven by the expected economic benefits including FDI inflows from joining PTA.

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1. Introduction

In the initial stage of preferential trade agreement (PTA) formation, large economies played major roles as in the case of the EU and NAFTA. However, a new feature observed in the formation of PTAs especially in the Asia and Europe lately is that small economies are very eager to form new PTAs or to join existing PTAs with large economies. One of the very important driving forces behind the increased efforts to form PTAs is the high expectation for FDI inflows as a result of PTA formation. Recent data support these optimistic expectations.

For an example, a significant increase in the FDI inflows into 15 small economies is observed after the formation of PTA with the United States as shown in Fig. 1 and Table 1. Fig. 1 shows that the FDI inflows into the small economies increased by 50.5% in the first year of the FTA formation with the United States. In addition, the trend of increased FDI inflows is continued for the following 3 years.¹

Motivated by these recent features, this paper examines the rationale of a small country to join a PTA for the FDI inflows and focuses

on the strategic interactions between host countries' FDI policies and the location strategies of multinational firms. In many cases, a country's attempts to establish a preferential trade agreement are driven by concerns that they might be alienated from preferential market access when a competitor or a neighboring country arranges an agreement with another country. For instance, political and economic interest groups in Taiwan were worried that they might be excluded from preferential market access chances and experience a decrease in FDI inflows, i.e., investment diversion, immediately after the agreement on FTA formation was reached between South Korea and the United States in 2007.² These groups believed that the alienation from the market access chances would eventually lead to the deterioration of the welfare of the country that was excluded from the trade agreement. Motivated by these developments, we analyze the impact that a PTA might have on the FDI flows and possible asymmetric impacts on welfare of member and non-member countries of PTA.

Moreover, we frequently observe tax competition for FDI inflows within the trends of increasing PTA formation. There are a lot of examples supporting the argument for the tax competition taking the form of a "race to the bottom." Especially, an intense tax competition for FDI inflows can be observed among Central and Eastern European economies before they are admitted to the formal EU membership. For examples, Hungary had reduced corporation tax rates from 40% to 18% in 2000, and Poland had reduced from 40% to 32%, Slovakia reduced from 45% to 29% in 2000. However, an already admitted EU

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¹ The data on FDI inflows of 15 economies that signed free trade agreements with United States are from UNCTAD data, World Investment Directory from 1982 to 2010. Dollar figures are converted from nominal values using GDP deflator. The description of the data focusing on the change of the data before and after the event, i.e., the formation of FTA with the United States, as in Table 1 is termed as an 'event study' after Rosen (2004).

² See details at www.taipetimes.com or in the Taipei Times (03/05/2008).

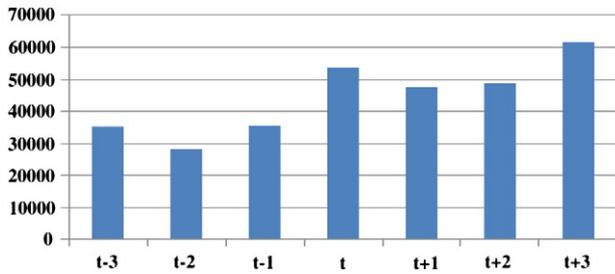


Fig. 1. FDI inflows into small economies that formed FTA with the United States.

member country such as Austria, which joined EU in 1995, had increased her tax rates from 30% to 34% in 2000 as shown in Table 2.

Motivated by this intense tax competition for FDI inflows, and the complicated strategies before and after the entry to PTA, this paper examines the optimal FDI policies for asymmetric countries considering the strategic implication of the PTA membership and the multinational firm's location strategies. More specifically, we consider the strategic interaction between the prospective host countries' FDI policies and a multinational firm's location strategies. In addition we analyze the strategic implication of obtaining a PTA membership in terms of increasing the market size by removing trade barriers between the PTA member countries. We demonstrate that a small economy can increase her bargaining power by joining PTA with a large economy since a multinational firm has a larger incentive to invest in the country. Therefore, a small economy can host FDI even with a lower tax incentive after joining PTA while a non-member small economy comes to give up the efforts to induce the FDI since the required incentives to induce the FDI are too expensive for the economy.

While there are many literatures that examined the welfare impact of PTAs and FDIs separately, there are only a limited number of literatures examining the link between PTAs and FDIs. According to

Markusen and Horstmann (1992), high tariff barriers induce a firm to choose FDI as a market entry mode. This claim is in agreement with the fact that there was a sharp increase in FDI inflows into EU after the adoption of EU as a common market in 1992, which increased trade barriers against non-member countries in relative terms. Therefore, the recent sharp decrease in international transaction costs is likely to encourage exports rather than foreign direct investment. However, foreign direct investment has dramatically risen over the last couple of decades, contradicting the claims made by Markusen and Horstmann (1992). It is widely believed that the formation of PTAs usually stimulates FDI, although there is not a generalized theory as to why this is true.

A country may induce FDI from a foreign firm by offering the firm a favorable policy, such as the reduction in profit tax rate. Haufler and Wooton (1999) examined how profit tax and tariff policies affect the location of international firms given the choice between countries with asymmetric market sizes. Motta and Norman (1996) also studied how the economic integration of three countries affects the location of multinational firms' plants. Economic integration can encourage foreign investors to locate in the integrated market without considering the government policy intervention. Riezman and Kose (2002) analyzed the impact that preferential trade agreements have on aggregate welfare using a calibration method within a general equilibrium framework. The results of their study indicate that the welfare of a non-member country is negatively affected by not participating in a preferential trade agreement. The welfare of an external country deteriorates in this situation due to member countries imposing optimal tariffs on the external country and the external country facing a "race to the bottom" in profit tax rates by international tax competition for the FDI.

Bjorvatn and Eckel (2006) employed a tax competition model in the presence of a local firm which affects the choice of location and investment policy of a foreign investor, focusing on the job creation effect of FDI. They found that the gap between wages and the shadow price of labor may influence a foreign firm's choice of location. In a re-

Table 1
FDI inflows into small economies that formed FTA with the United States (unit: U.S. million dollars).

Country (year FTA is formed with the United States)	t-3	t-2	t-1	t	t+1	t+2	t+3
Bahrain (2008)	930	2502	1464	1464	208	125	N/A
Chile (2004)	4107	2454	4057	6570	6190	6265	10452
Costa Rica (2007)	727	763	1261	1581	1696	1089	1132
Dominican Republic (2007)	833	995	931	1390	2342	1751	1302
El Salvador (2007)	333	453	207	1293	737	296	62
Guatemala (2007)	271	450	508	621	615	485	550
Honduras (2007)	501	532	574	774	821	423	639
Israel (1985)	62	119	131	162	202	307	353
Jordan (2001)	321	160	913	268	229	515	858
Mexico (1994)	5656	5111	4997	12243	10388	9842	13486
Morocco (2006)	2180	820	1466	2103	2339	2030	1578
Nicaragua (2007)	229	214	246	318	511	351	407
Oman (2009)	1363	2862	2064	1190	1638	N/A	N/A
Peru (2009)	2976	4579	5651	4509	5870	N/A	N/A
Singapore(2004)	14752	6160	11248	19258	13703	25194	30883
Aggregate	35240	28172	35717	53744	47490	48672	61703
Average	2349	1878	2381	3582	3166	3744	5141

Table 2
Corporation tax rates in 1993, 2000 and target rates.

Tax rates	1993	2000	Target rates
Czech Republic	45	31	25
Poland	40	32	22
Slovakia	45	29	25
Hungary	40	18	18
Austria	30	34	34
Germany	45	40	25

cent study of tax policy and the FDI game, [Haufler and Wooton \(2006\)](#) introduced a three-country model showing that tax coordination between small countries can lead to welfare gains, and in that respect, can be regarded as a closest approach to ours. However, there are three main differences between [Haufler and Wooton's study \(2006\)](#) and our study. First, we include trade costs as a strategic variable for the government to consider all regulatory policies that determine the international transaction costs, that are not addressed by [Haufler and Wooton \(2006\)](#). Second, we focus on the strategic aspects between the member and non-member countries of preferential trade arrangements while [Haufler and Wooton \(2006\)](#) focused on the coordination of small countries in an attempt to prevent excessive tax increases caused by intense tax competition. Third, we consider the strategic impact of PTA formation on the government FDI policies and the multinational firm's location choice that were not considered in earlier studies. In addition, we compare the welfares of the countries under the FTA with those of the most favored nations (MFN).

Based on a simple model where three asymmetric countries are competing for FDI inflows via tax competition, we demonstrate that the formation of PTA provides strategic advantage to a small PTA member country in her tax competition not only with non-member countries, but with a large member country. In addition, it is shown that the non-member country's efforts to induce FDI inflows via tax competition might deteriorate welfare due to excessive policy incentives required to induce FDI inflows after the formation of PTA. The results imply that the small economies are the major beneficiaries with increased FDI inflows from arranging PTA.

The remainder of this paper is organized as follows. A basic model is introduced in [Section 2](#). In [Section 3](#) we discuss the tax policy competition among countries under the MFN regime as a benchmark case. In [Section 4](#) we discuss the situation in which the firm chooses a location and, once the FTA has formed, the government competes for the FDI using taxes. [Section 5](#) discusses the policy implication and concludes.

2. The model

2.1. The consumer

We consider a model where there is one large economy and two small countries, with the same market size, while a multinational firm tries to invest in one of the three countries. The populations of the small countries are normalized to 1, while the population size of the large country, n is larger than 1. The preference of a representative consumer is defined by the following quadratic quasi-linear function:

$$u_i = \alpha x_i - \frac{1}{2} \beta x_i^2 + z_i \forall i \in \{l, s_1, s_2\}, \tag{1}$$

where z_i is the numeraire product and x_i is the monopoly product supplied by a foreign monopoly.

The consumer receives wage, w , by supplying one unit of labor. All tax revenues are equally distributed in a lump-sum fashion. T_i represents the per capita tax revenues. The budget constraint is defined as follows:

$$w + T_i = z_i + q_i x_i \quad \forall i \in \{l, s_1, s_2\}, \tag{2}$$

where q_i is the consumer price of product x in country i . The inverse demand for product x is derived from utility maximization as follows:

$$\alpha - \beta x_i = q_i \quad \forall i \in \{l, s_1, s_2\}$$

where β is the parameter representing the scale of the price elasticity of the demand.

The aggregated demand curve in each country is defined as follows:

$$X_l = nx_l = \frac{n(\alpha - q_l)}{\beta}, X_{s_1} = x_{s_1} = \frac{(\alpha - q_{s_1})}{\beta}, X_{s_2} = x_{s_2} = \frac{(\alpha - q_{s_2})}{\beta}. \tag{3}$$

2.2. The firm

We assume that the plant specific costs are high enough compared to the trade-related transaction costs. Therefore, a multinational firm locates only in one country, and then serves the other markets via exporting. The trade cost (τ_j^i) is added to the domestic consumer price when the country imports instead of hosting FDI. τ_j^i denotes the trade cost for good produced in country i and consumed in country j , which includes not only import tariffs imposed by country j but non-tariff trade costs such as regulatory measures for technology and safety standards. Hence, q_j^i denotes the consumer price for good produced in country i and consumed in country j . The consumer price in each country is given as follows:

$$\begin{aligned} q_l^l &= p_l, q_{s_1}^l = p_l + \tau_{s_1}^l, q_{s_2}^l = p_l + \tau_{s_2}^l && \text{for FDI in } l; \\ q_{s_1}^{s_1} &= p_{s_1}, q_l^{s_1} = p_{s_1} + \tau_l^{s_1}, q_{s_2}^{s_1} = p_{s_1} + \tau_{s_2}^{s_1}, && \text{for FDI in } s_1; \\ q_{s_2}^{s_2} &= p_{s_2}, q_l^{s_2} = p_{s_2} + \tau_l^{s_2}, q_{s_1}^{s_2} = p_{s_2} + \tau_{s_1}^{s_2}, && \text{for FDI in } s_2. \end{aligned} \tag{4}$$

The host country imposes a lump-sum tax, while the importing countries impose optimal tariffs on the goods from the host country. The firm's profit functions from FDI in each country are defined as follows:

$$\begin{aligned} \Pi_l &= (p_l - w) [X_l(q_l^l) + X_{s_1}(q_{s_1}^l) + X_{s_2}(q_{s_2}^l)] - F - t_l && \text{for FDI in } l; \\ \Pi_{s_1} &= (p_{s_1} - w) [X_l(q_l^{s_1}) + X_{s_1}(q_{s_1}^{s_1}) + X_{s_2}(q_{s_2}^{s_1})] - F - t_{s_1} && \text{for FDI in } s_1; \\ \Pi_{s_2} &= (p_{s_2} - w) [X_l(q_l^{s_2}) + X_{s_1}(q_{s_1}^{s_2}) + X_{s_2}(q_{s_2}^{s_2})] - F - t_{s_2} && \text{for FDI in } s_2, \end{aligned}$$

From the first order condition of profit maximization problem, the optimal price in each case of FDI is derived as follows:

$$\begin{aligned} p_l &= \frac{1}{2} \left[(\alpha + w) - \frac{\tau_{s_1}^l + \tau_{s_2}^l}{n + 2} \right] && \text{for FDI in } l; \\ p_{s_1} &= \frac{1}{2} \left[(\alpha + w) - \frac{n\tau_l^{s_1} + \tau_{s_2}^{s_1}}{n + 2} \right] && \text{for FDI in } s_1; \\ p_{s_2} &= \frac{1}{2} \left[(\alpha + w) - \frac{n\tau_l^{s_2} + \tau_{s_1}^{s_2}}{n + 2} \right] && \text{for FDI in } s_2 \end{aligned} \tag{5}$$

The optimal prices depend on the tariffs and the sizes of the markets. Using the optimal prices, profit of firm can be rearranged in the indirect functional form:

$$\begin{aligned} \Pi_l &= \pi_l(\alpha, n, w, \tau) - F - t_l && \text{for FDI in } l; \\ \Pi_{s_1} &= \pi_{s_1}(\alpha, n, w, \tau) - F - t_{s_1} && \text{for FDI in } s_1; \\ \Pi_{s_2} &= \pi_{s_2}(\alpha, n, w, \tau) - F - t_{s_2} && \text{for FDI in } s_2, \end{aligned} \tag{6}$$

where π represents the operating profits of the firm. Equations in (6) can be rearranged into the following equation: $\pi_l - \pi_s = t_l - t_s$ if $\Pi_l = \Pi_s$. Therefore, " $\pi_l - \pi_s > 0$ " implies " $t_l - t_s > 0$ " when $\Pi_l = \Pi_s$. In other words, the firm will incur a larger tax burden from a large country since it makes higher operating profits in that country. However, the firm is indifferent between locating in country l or s even though it incurs a higher tax rate in country l , that was labeled as a "tax premium" by [Haufler and Wooton \(1999\)](#). Tax premium is equivalent to the profit difference from two countries. In other words, a firm is willing to pay more tax by the amount of tax premium since the firm

obtains a higher profit from the locating in the country by the amount of tax premium. The tax premiums in each pair of host countries are derived as follows:

where $\Gamma_{l-s_1}^{MFN}$ is equal to $\Gamma_{l-s_2}^{MFN}$ only if $\tau_{s_2}^{s_1} = \tau_{s_1}^{s_2}$, $\tau_{s_2}^l = \tau_{s_1}^l$ and $\tau_{l_1}^{s_1} = \tau_{l_1}^{s_2}$. These results indicate that optimal tariffs play a critical role in a firm's location decision under both the MFN and FTA regimes.

$$\begin{aligned} \Gamma_{l-s_1}^{MFN} \equiv t_l - t_{s_1} &\equiv \frac{[2(\alpha-w)(n+2) - n\tau_{l_1}^{s_1} - \tau_{s_1}^l - \tau_{s_2}^{s_1} - \tau_{s_2}^l] [n\tau_{l_1}^{s_1} - \tau_{s_1}^l + \tau_{s_2}^{s_1} - \tau_{s_2}^l]}{4\beta(n+2)}; \\ \Gamma_{l-s_2}^{MFN} \equiv t_l - t_{s_2} &\equiv \frac{[2(\alpha-w)(n+2) - n\tau_{l_1}^{s_2} - \tau_{s_2}^l - \tau_{s_1}^{s_2} - \tau_{s_1}^l] [n\tau_{l_1}^{s_2} - \tau_{s_2}^l + \tau_{s_1}^{s_2} - \tau_{s_1}^l]}{4\beta(n+2)}; \\ \Gamma_{s_1-s_2}^{MFN} \equiv t_{s_1} - t_{s_2} &\equiv \frac{[2(\alpha-w)(n+2) - n\tau_{l_1}^{s_1} - n\tau_{l_1}^{s_2} - \tau_{s_1}^{s_2} - \tau_{s_2}^{s_1}] [n(\tau_{l_1}^{s_2} - \tau_{l_1}^{s_1}) + \tau_{s_1}^{s_2} - \tau_{s_2}^{s_1}]}{4\beta(n+2)}, \end{aligned} \tag{7}$$

3. MFN (most favored nations) case: tax offer, location decision and welfare

Tax competition among countries greatly influences the firm's decision on where to locate its business. The strategic interactions among the countries and the firm can be described as the following three-stage game.

Stage 1: Governments of country l , s_1 and s_2 determine their profit tax rates, t_i , and trade costs, τ_i , which include tariff and non-tariff trade costs.

Stage 2: The firm observes the government policies and chooses its location.

Stage 3: The firm decides her profit maximizing pricing strategies and serves three markets.

The government of each country commits her tax rates as an incentive program to encourage multinational firms to invest in their own jurisdictions taking consideration of the strategic reaction of the multinational firm that are very sensitive to the host country's asymmetric market size and the incentive packages offered by each government. In addition, each government decides trade costs that include import tariffs imposed on import goods and non-tariff trade costs such as regulatory measures including safety standards and technology standards applied to imported goods. After the government policies are announced, a multinational firm makes her location decision among three countries taking consideration of the asymmetric market size of each country and the incentive packages offered by each country. After the location decision is made, the firm makes her decision on her strategic variables, i.e., pricing strategies, and consumers in each country make consumption decision. The sub-game perfect Nash equilibrium of this game can be derived by backward induction.

A country imposes a tax when she is the host country of FDI, or sets an import tariff when she is an importing country. The tax and tariff revenues, defined as follows, are returned to consumers of country l in each case of FDI location:

$$\begin{aligned} T_l &= t_l/n, \quad T_{s_1} = \tau_{s_1}^l \chi_{s_1}^l, \quad T_{s_2} = \tau_{s_2}^l \chi_{s_2}^l && \text{for FDI in } l; \\ T_l &= \tau_l^{s_1} \chi_l^{s_1}, \quad T_{s_1} = t_{s_1}, \quad T_{s_2} = \tau_{s_2}^{s_1} \chi_{s_2}^{s_1} && \text{for FDI in } s_1; \\ T_l &= \tau_l^{s_2} \chi_l^{s_2}, \quad T_{s_1} = \tau_{s_1}^{s_2} \chi_{s_1}^{s_2}, \quad T_{s_2} = t_{s_2} && \text{for FDI in } s_2. \end{aligned} \tag{8}$$

If the firm locates in country l , the consumers in country l receive the tax revenues while the tariff revenues are transferred to consumers in country l when FDI is located in other countries. Hence, the consumer utility of country l from each case of FDI location is given as follows:

$$\begin{aligned} u &= \frac{1}{2\beta} \left[\frac{(n+2)(\alpha-w) + \tau_{s_1}^l + \tau_{s_2}^l}{2(n+2)} \right]^2 + \frac{t_l}{n} + w && \text{for FDI in } l; \\ u_{s_1} &= \frac{1}{2\beta} \left[\frac{(n+2)(\alpha-w) + n\tau_{l_1}^{s_1} + \tau_{s_2}^{s_1}}{2(n+2)} \right]^2 - \frac{1}{2\beta} (\tau_{l_1}^{s_1})^2 + w && \text{for FDI in } s_1; \\ u_{s_2} &= \frac{1}{2\beta} \left[\frac{(n+2)(\alpha-w) + n\tau_{l_1}^{s_2} + \tau_{s_1}^{s_2}}{2(n+2)} \right]^2 - \frac{1}{2\beta} (\tau_{l_1}^{s_2})^2 + w && \text{for FDI in } s_2. \end{aligned} \tag{9}$$

When the firm invests in country l , countries s_1 and s_2 set the optimal tariffs derived from the first order condition of welfare maximization problem: $\partial u_{s_1}^l / \partial \tau_{s_1} = 0$, $\partial u_{s_2}^l / \partial \tau_{s_2} = 0$. Table 3 summarizes the optimal tariffs in each case of FDI location.

Several observations can be made about optimal tariffs by examining Table 3. First, the level of tariffs determined by country l is larger than the levels determined by countries s_1 and s_2 . Second, country l sets the same level of tariffs against both country s_1 and country s_2 . Third, the levels of tariffs set by both small countries are equal to each other. These results indicate that if the market size of country l is larger than the market size of countries s_1 and s_2 , then the tariff set by country l will be proportionately larger than the tariffs set by countries s_1 and s_2 . In other words, the tariff gap between the large country and the small countries increases proportionately to the difference of the market size. This result implies that a multinational firm has an incentive to locate its business in country l in order to avoid a higher tariff rate in addition

to a market access chance to a larger market. In order to determine the equilibrium location of the firm, we identify the value of the tax premium by substituting the optimal tariffs into the tax premiums equation, Eq. (7), as follows:

$$\begin{aligned} t_l - t_{s_k}^{MFN} &\equiv t_l - t_{s_k} \equiv \frac{(n-1)(n+1)^2(n+2)^3(5n^3+47n^2+126n+94)(\alpha-w)^2}{\psi\phi\beta} > 0, \text{ when } k = 1, 2; \\ t_{s_1} - t_{s_2}^{MFN} &\equiv t_{s_1} - t_{s_2} = 0; \\ t_{s_2} - t_{s_1}^{MFN} &\equiv t_{s_2} - t_{s_1} = 0. \end{aligned}$$

where $\psi = (2n^2 + 8n + 7)^2$ and $\phi = (3n^2 + 16n + 15)^2$.

The tax premium for country l is always positive, because the firm is willing to bear a higher tax burden in country l since it obtains higher operating profits in country l compared to the case of locating in country s_1 or s_2 . However, the multinational firm is not willing to bear a higher tax burden in either country s_1 or s_2 , because the profits from both countries are equivalent. Therefore, the tax premium for countries s_1 and s_2 is zero.

Next, we examine the location strategy for the firm in the second stage of the game where the tax policy is crucial in the location of the firm. Taking the tax policies of governments as given, the firm will determine where to invest. Substituting the optimal tariffs into Eq. (9) yields the utility of the consumers in country l in each case of FDI location. Consumer utility of country l is represented by u_l^i when she imports goods, and u_l^f represents the consumer utility when country l hosts a foreign investment:

$$\begin{aligned} u &= \frac{(n+2)^4(\alpha-w)^2}{2\psi} + \frac{t_l}{n} + w \text{ for FDI in } l \text{ and} \\ u &= \frac{(n+2)^2(3n^2+16n+16)(\alpha-w)^2}{2\phi\beta} + w \text{ for FDI in } s_k, \end{aligned} \tag{10}$$

where $\psi = (2n^2 + 8n + 7)^2$ and $\phi = (3n^2 + 16n + 15)^2$.

The government efforts of country l to attracting FDI should satisfy the individual rationality condition implying that social welfare of country l with FDI should be higher than that without FDI inflows importing the good from another country; $u_l^f \geq u_l^k$. Thus, the tax on FDI, which satisfies the individual rationality condition for country l , is determined from the binding condition of consumer utilities under two different cases of FDI location, $u_l^f = u_l^k$ where $k = 1, 2$. Country l is willing to offer the minimum tax rate to induce the investment from the firm as follows:

$$t_{l(s_1)}^{MFN} = t_{l(s_2)}^{MFN} = \frac{n(n+2)^2(3n^6+28n^5+86n^4+72n^3-118n^2-244n-116)(\alpha-w)^2}{2\psi\phi\beta} > 0.$$

The above result implies that the larger is the host country's market size, the higher is the tax rate imposed by the country ($\partial t / \partial n > 0$). If the market size of country l is larger than the critical value, $\alpha > 1.38$, it imposes a tax instead of a subsidy. Country s_1 would, however, offer a subsidy in order to outbid countries l and s_2 in a tax competition for FDI. Due to the symmetry of small countries, we easily derives the maximum subsidy rates for country s_2 when competing with countries l and s_1 . The maximum subsidy rates offered by small countries are given as follows:

$$t_{s_1(l)MFN} = t_{s_2(l)}^{MFN} = -\frac{(n+2)^2(28n^6+240^5+721n^4+832n^3+70n^2-496n-239)(\alpha-w)^2}{8\psi\phi\beta} < 0$$

and

$$t_{s_1(s_2)MFN} = t_{s_2(s_1)}^{MFN} = -\frac{(n+2)^2(\alpha-w)^2}{2\phi\beta} < 0$$

From the preceding equations, we find that countries s_1 and s_2 make identical bids. In addition, it is determined that country l will bid less than countries s_1 and s_2 , because her larger market size creates stronger bargaining power in the tax competition. The tax difference between the large country and small country turns out to be:

$$\Delta t_{l-s_k}^{MFN} = t_{l(s)}^{MFN} - t_{s(l)}^{MFN} = \frac{(n+2)^2(12n^7+140n^6+584n^5+1009n^4+360n^3-906n^2-960n-239)(\alpha-w)^2}{8\psi\phi\beta} > 0$$

Table 3
Optimal trade cost.

Location of firm	Importing country	Optimal trade cost
l	s_1	$T_{s_1}^l = \frac{(n+2)(\alpha-w)}{2(2n^2+8n+7)}$
	s_2	$T_{s_2}^l = \frac{(n+2)(\alpha-w)}{2(2n^2+8n+7)}$
s_1	l	$T_l^{s_1} = \frac{n(n+2)(\alpha-w)}{3n^2+16n+15}$
	s_2	$T_{s_2}^{s_1} = \frac{(n+2)(\alpha-w)}{3n^2+16n+15}$
s_2	l	$T_l^{s_2} = \frac{n(n+2)(\alpha-w)}{3n^2+16n+15}$
	s_1	$T_{s_1}^{s_2} = \frac{(n+2)(\alpha-w)}{3n^2+16n+15}$

The value of $\Delta_{l-s_k}^{MFN}$ is positive, implying that the firm will be charged with a higher tax if it chooses to locate in country l . Even though it faces the higher tax imposed by country l , the firm prefers to locate in country l . This is due to the fact that the larger market size of country l guarantees profits which are large enough to offset the higher tax burden. The firm is likely to locate in country l when the additional tax that the firm is willing to pay is larger than the actual tax difference between the countries. Therefore, the firm chooses to locate in country l due to the fact that the tax premium exceeds the tax difference. The result was as follows:

$$\Gamma_{l-s_k}^{l-s_kMFN} - \Delta_{l-s_k} = \frac{(28n^7 + 356n^6 + 1592n^5 + 3023n^4 + 1696n^3 - 2118n^2 - 3312n - 1265)(n+2)^2(\alpha-w)^2}{32\psi\phi\beta} > 0$$

Therefore the firm will choose to enter country l if the value of $\Gamma_{l-s_k}^{MFN} - \Delta_{l-s_k}^{MFN}$ is positive.

Finally, we consider the equilibrium tax imposed to the multinational firm. Since country l knows the location strategy of the firm, it calculates the best offer to the firm in equilibrium. We can rewrite the $\Gamma_{l-s_k}^{MFN} - \Delta_{l-s_k}^{MFN} > 0$ as $\Gamma_{l-s_k}^{MFN} - (t_{l(s)}^{MFN} - t_{s(l)}^{MFN}) > 0$ where $t_{s(l)}^{MFN}$ is the maximum offer made by small countries when competing with country l . Then in equilibrium, country l will eventually offer as follows:

$$t_{l(s)}^{MFN*} = \Gamma_{l-s_k}^{MFN} + t_{s(l)}^{MFN} + \varepsilon$$

Country l will save location incentive as much as $t_{l(s)}^{MFN} - t_{l(s)}^{MFN*}$ since $t_{l(s)}^{MFN*}$ is given to the firm in equilibrium.

4. Impacts of FTA formation on the tax competition, MNC's location and welfare

If countries l and s_1 agree to form a free trade agreement, then the trade barriers are removed between two countries. We examine how the formation of FTA would impact the tax premium of the firm, the tax competition and the welfares of the countries. The sequence of the game is similar to the case of MFN except in stage 0 when country l and s_1 forms the FTA as follows:

Stage 0: l and s_1 form the FTA.

Stage 1: l , s_1 and s_2 set the tax policies, t_i , and the trade costs, τ_i .

Stage 2: The firm observes the government policies and chooses its location.

Stage 3: The firm decides her profit maximizing pricing strategies and serves the integrated markets and non-member country's market.

The sub-game perfect Nash equilibrium is characterized by backward induction.

4.1. Impacts of the FTA formation on the tax premium

When country l and s_1 agree to form FTA, the tariffs between two member countries are removed, $\tau_{s_1}^l = 0$, $\tau_l^{s_1} = 0$, while they set the optimal tariffs with respect to non-member countries as noted in Table 1.

The post-FTA tax premiums are derived as follows based on the optimal tariffs and Eq. (7):

$$\begin{aligned} \Gamma_{l-s_1}^{FTA} &= \frac{(\alpha-w)^2(24n^4 + 224n^3 + 709n^2 + 896n + 391)(n^2-1)(n+2)}{16\psi\phi\beta} > 0; \\ \Gamma_{l-s_2}^{l-s_2FTA} &= \frac{(\alpha-w)^2(20n^4 + 208n^3 + 695n^2 + 896n + 391)(4n^4 + 16n^3 + 15n^2 - 1)(n+2)}{16\psi\phi\beta} > 0; \\ \Gamma_{s_1-s_2}^{s_1-s_2FTA} &= \frac{(\alpha-w)^2(5n^2 + 32n + 28)n^2(n+2)}{4\phi\beta} > 0. \end{aligned}$$

The above results show that country s_1 comes to have a strategic advantage with respect to country s_2 , as shown by a positive tax premium of country s_1 with respect to country s_2 . The exclusive market access chance for the firm located in country s_1 provides the strategic advantage to country s_1 after she arranges a bilateral FTA with a large country, l as shown in the following changes in the tax premium after the formation of FTA.

$$\begin{aligned} \Gamma_{l-s_1}^{l-s_1FTA} - \Gamma_{l-s_1}^{MFN} &= -\frac{(\alpha-w)^2(80n^6 + 1152n^5 + 6392n^4 + 17696n^3 + 25947n^2 + 19200n + 5625)(n^2-1)(n+2)}{16\psi\phi\beta} < 0; \\ \Gamma_{l-s_2}^{l-s_2FTA} - \Gamma_{l-s_2}^{MFN} &= \frac{(8n^3 + 48n^2 + 89n + 50)}{16\psi\phi\beta} > 0; \\ \Gamma_{s_1-s_2}^{s_1-s_2FTA} - \Gamma_{s_1-s_2}^{MFN} &= \frac{n^2(5n^2 + 32n + 28)(n+2)(\alpha-w)^2}{4\phi\beta} > 0. \end{aligned} \tag{11}$$

The first equation in Eq. (10) indicates that the tax premium required to induce the FDI inflows into country s_1 after the formation of FTA is lower than the case of MFN before the FTA formation. At the same time, the tax premium required to induce FDI inflows into country s_2 becomes higher after the formation of FTA between country l and s_1 due to the strategic market access advantage of country s_1 . The intuition behind this result is that when the market is integrated through the FTA, there is a greater incentive for the firm to enter into the integrated market. Therefore, the FTA strengthens the 'bigger market preference' of the multinational firm.

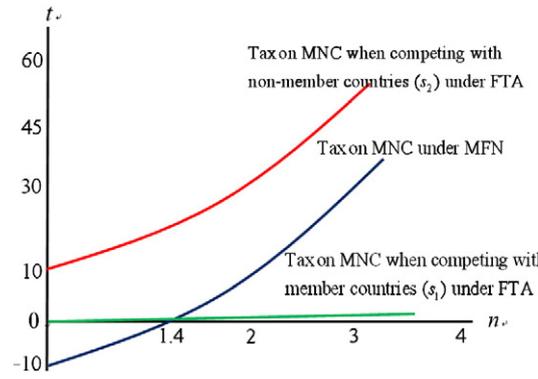


Fig. 2. The impact of FTA formation on the tax on FDI by a large FTA member country, l .

4.2. The impacts of FTA formation on tax competition for FDI inflows

4.2.1. Tax competition policies of a large FTA member country (l) for FDI inflows

The consumer utility of country l in each case of FDI location is derived as follows by substituting the optimal tariffs into the utility functions:

$$\begin{aligned}
 u_l^i &= \frac{(2n+3)^2(2n+5)^2(\alpha-w)^2}{32\psi\phi\beta} + w + \frac{t_l}{n} && \text{for FDI in } l; \\
 u_l^{s_1} &= \frac{(3n^3+22n^2+48n+32)^2(\alpha-w)^2}{8(n+2)^2\phi\beta} + w && \text{for FDI in } s_1; \\
 u_l^{s_2} &= \frac{(n+2)^2(3n^2+16n+16)(\alpha-w)^2}{2\phi\beta} + w && \text{for FDI in } s_2;
 \end{aligned}
 \tag{12}$$

The equilibrium profit taxes on the multinational firm, when country l is competing with country s_1 and s_2 , are derived from the binding conditions of the locations as follows:

$$t_{l(s_1)FTA} = \frac{n(24n^4 + 224n^3 + 723n^2 + 960n + 449)(n^2 - 1)(\alpha - w)^2}{32\psi\phi\beta} \geq 0$$

and

$$t_{l(s_2)FTA} = \frac{n(48n^8 + 640n^7 + 3432n^6 + 9504n^5 + 14343n^4 + 11040n^3 + 2862n^2 - 960n - 449)(\alpha - w)^2}{32\psi\phi\beta} > 0$$

where $t_{l(s_1)FTA} - t_{l(s_2)FTA} < 0$.

We observe that $t_{l(s_2)FTA}$ is higher than $t_{l(s_1)FTA}$. When FTA is formed between country l and s_1 , country l imposes a lower tax than the case of MFN when she is competing with country s_1 to attract the firm. The elimination of the trade barriers also eliminates the multinational firm's location preference for a larger country between the two countries. It is shown that country l should provide larger policy incentives than the case of MFN to attract FDI inflows in her tax competition with country s_1 .

The profit tax rate under the FTA is different than the rate under the MFN, as shown in the follows:

$$t_{l(s_1)FTA} - t_{l(s_1)MFN} = - \frac{n(48n^8 + 640n^7 + 3336n^6 + 8224n^5 + 7525n^4 - 7584n^3 - 24750n^2 - 6975)(\alpha - w)^2}{32\psi\phi\beta} < 0$$

and

$$t_{l(s_2)FTA} - t_{l(s_2)MFN} = \frac{n(31 + 32n + 8n^2)(\alpha - w)^2}{32\psi\phi\beta} > 0$$

Under the MFN, the equilibrium tax rates of country l imposed on a multinational firm under the implicit tax competition with two small countries are equal ($t_{l(s_1)MFN} = t_{l(s_2)MFN}$). After the formation of the FTA, the tax rate of country l increases under implicit competition with the non-member country s_2 , while the tax rates of country l decreases under the implicit tax competition with the FTA member country s_1 . These results are shown in Fig. 2. Country l can still attract the firm at an even higher tax level when competing against a non-member country. In contrast, the results indicate that, in a tax game with country s_1 , country l will fail to attract the firm unless it lowers its tax rate. Thus, the intensity of tax competition between members increases, while the intensity of tax competition between a member and a non-member decreases.

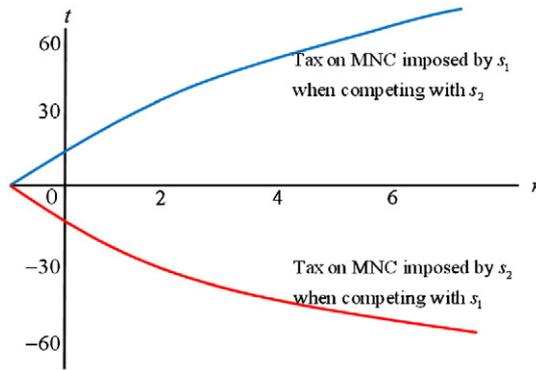


Fig. 3. Impact of FTA on the bargaining power of S_1 and S_2 .

4.2.2. Tax competition policies of a small FTA member country (s_1) for FDI inflows

The equilibrium taxes on the multinational firm imposed by a small FTA member country (s_1) is derived from the binding conditions of implicit tax competition with country l and a non-member country (s_2) as follows:

$$t_{s_1(l)}^{FTA} = - \frac{(24n^4 + 224n^3 + 723n^2 + 960n + 449)(n^2 - 1)(\alpha - w)^2}{32\psi\phi\beta} < 0,$$

$$t_{s_1(s_2)}^{FTA} = \frac{(7n^4 + 32n^3 + 28n^2 - 16n - 16)(\alpha - w)^2}{8\phi\beta} > 0.$$

Country s_1 offers a subsidy when she competes with a large member country, l , and imposes a tax when she competes with a non-member country s_2 . In addition, we determine that the FTA formation lowers the equilibrium subsidies required to induce the FDI inflows by country s_2 when she is competing with a large country, l . This result is shown in the following comparison of equilibrium tax on the multinational firm by the small FTA member country, s_1 , under FTA and under MFN regime when she is competing with a large country, l : $t_{s_1(l)}^{FTA} - t_{s_1(l)}^{MFN} > 0$.³

The above results show that the amount of subsidies for s_1 to induce FDI inflows is reduced in her tax competition with country l due to the strategic advantage in the tax competition after the formation of FTA. This strategic advantage is provided by the preferential market access chance given to firms located in country s_1 . In addition, the strategic advantage enables country s_1 to impose an tax on the multinational firm under FTA while she has to offer a subsidy to attract FDI the MFN regime when she competes with non-member country, s_2 , and these results are summarized in Proposition 1.

Proposition 1. The FTA formation provides a strategic advantage to a small FTA member country in her tax competition for FDI inflows.

4.2.3. Tax competition policies of a non-member country (s_2) for FDI inflows

The equilibrium taxes on the multinational firm by non-member small country, s_2 , are given from the binding conditions of implicit tax competition with country l and s_1 as follows:

$$t_{s_2(l)}^{FTA} = - \frac{(\alpha - w)^2 (112n^8 + 1408n^7 + 7244n^6 + 19760n^5 + 31247n^4 + 30336n^3 + 20114n^2 + 10320n + 3151)n}{32\psi\phi\beta} < 0$$

$$t_{s_2(s_1)}^{FTA} = - \frac{(7n^4 + 32n^3 + 36n^2 + 16n + 16)(\alpha - w)^2}{8\phi\beta} < 0,$$

where $t_{s_2(l)}^{FTA} - t_{s_2(s_1)}^{FTA} \approx 0$.

Country s_2 offers the subsidies defined as $t_{s_2(l)}^{FTA}$ and $t_{s_2(s_1)}^{FTA}$ when she competes with the FTA member countries, l and s_1 respectively. The difference between these subsidies is approximately zero when the market size of country l is large enough. This result reflects the fact that s_2 treats country s_1 and country l equally because country s_1 has an unlimited market access to a large country. This tendency is stronger when the market size of country l is relatively large as shown in Fig. 3.

In order to determine how the FTA impacts the bargaining power of s_2 in the tax competition, the equilibrium policies under the MFN regime are compared with those under the FTA regime as follows:

$$t_{s_2(l)}^{FTA} - t_{s_2(l)}^{MFN} = - \frac{(8n^2 + 32n + 31)(\alpha - w)^2}{32\phi\beta} < 0$$

and

$$t_{s_2(s_1)}^{FTA} - t_{s_2(s_1)}^{MFN} = - \frac{n^2(7n^2 + 32n + 32)(\alpha - w)^2}{8\phi\beta} < 0$$

³ $t_{s_1(l)}^{FTA} - t_{s_1(l)}^{MFN} = \frac{(48n^9 + 752n^8 + 4774n^7 + 15372n^6 + 26005n^5 + 16845n^4 - 13038n^3 - 29578n^2 - 17775n - 3375)(\alpha - w)^2}{32\psi\phi\beta} > 0.$

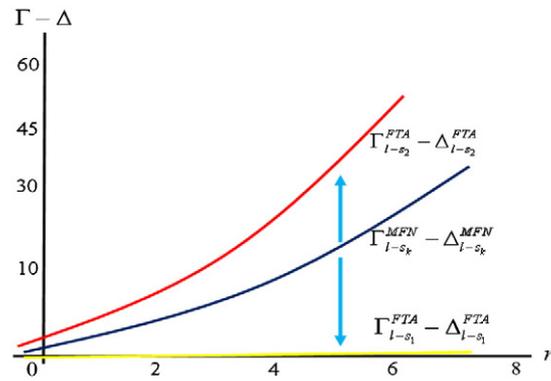


Fig. 4. The impact of FTA on the location choice of the firm.

The above results show that country s_2 offers more subsidies in order to attract the FDI after FTA formation, which means that the FTA undermines country s_2 's bargaining power in tax competition. In addition, when the market size of country l is larger, the bargaining power of country s_2 gets lower.

Proposition 2. The FTA formation undermines the bargaining power of a non-member country in her tax competition for the FDI inflows.

A multinational firm will choose its location in a country i if the tax premium, Γ , defined as an additional tax ready to be paid by the firm, of the country is higher than the differences of equilibrium taxes between competing countries as follows: $\Gamma_{i-j}^{FTA} > \Delta_{i-j}^{FTA} = t_{i(j)FTA} - t_{j(i)FTA}$. When we compare the tax premium and the equilibrium tax difference of each case with substituting equilibrium values, we obtain the following result:

$$0 \approx \Gamma_{l-s_1}^{FTA} - \Delta_{l-s_1}^{FTA} < \Gamma_{l-s_k}^{MFN} - \Delta_{l-s_k}^{MFN} < \Gamma_{l-s_2}^{FTA} - \Delta_{l-s_2}^{FTA} \quad k = 1, 2$$

The above result shows that under the MFN regime, the multinational firm always prefers to locate in the large country l . However, after FTA is formed, the multinational firm might have an equivalent preference in locating in either member country of FTA, country l or country s_1 when the transaction cost between two countries are low enough as shown in Fig. 4, and these results are summarized in Proposition 3.

Proposition 3. FTA formation increases the bargaining power of a small member country in the tax competition for FDI inflows because the multinational firm might have an equivalent preference in locating in either member country of FTA, country l or country s_1 when the transaction cost between two countries are low enough.

4.3. Impacts of the FTA formation on the welfare

In this section, we discuss how the FTA formation influences the welfares of a member country and a non-member country. We assume that the consumers have identical preferences, that all tax revenues are redistributed to the consumers, and that the monopoly firm transfers all of the profits to her home country. We consider the following three cases: (i) the firm chooses to locate in country l , (ii) the firm chooses to locate in country s_1 and (iii) the firm chooses to locate in country s_2 .

4.3.1. Welfare effects when the FDI is located in a large FTA member country, l

In the absence of the FTA, the welfare of the consumers in countries s_1 and s_2 are identical due to the market size symmetry. The FTA creates a welfare gap between countries s_1 and s_2 such that the social welfare of the member country s_1 is higher than the welfare of the non-member country s_2 as follows:

$$dW_{s_1-s_2}^{MFN} = 0, dW_{s_1-s_2}^{FTA} = \frac{(n+2)^2(\alpha-w)^2}{8\psi\beta} > 0.$$

where $dW_{s_1-s_2}^{MFN}$ and $dW_{s_1-s_2}^{FTA}$ define the welfare differences between countries s_1 and s_2 under the MFN and FTA, respectively.

The identical welfares of the two countries are a direct result of the identical market sizes. After the formation of the FTA, an individual consumer in country s_1 is better off than a consumer in country s_2 because of the reduced consumer price resulting from the elimination of the trade barriers within the FTA area. The consumers in country s_2 experience a welfare loss due to the upward price distortion of the imported goods even if the tariff revenues are transferred to the consumers.

4.3.2. Welfare effects when the FDI is located in a small FTA member country, s_1

If the multinational firm chooses to locate in country s_1 , the welfare of country s_1 is higher than the welfare of s_2 after the formation of the FTA as shown in the follows:

$$dW_{s_1-s_2}^{MFN} = 0, dW_{s_1-s_2}^{FTA} = \frac{n^2(7n^2 + 32n + 32)(\alpha-w)^2}{8\phi\beta} > 0.$$

⁴ $\Gamma_{l-s_1}^{FTA} - \Delta_{l-s_1}^{FTA} = \frac{(n-1)(n+1)(24n^5+296n^4+1367n^3+2945n^2+2957n+1115)(\alpha-w)^2}{32\phi\beta^2} \geq 0$ and $\Gamma_{l-s_1}^{FTA} - \Delta_{l-s_1}^{FTA} \rightarrow 0$ as $n \rightarrow \infty$. $\Gamma_{l-s_2}^{FTA} - \Delta_{l-s_2}^{FTA} = \frac{(160n^9+2512n^8+15992n^7+53812n^6+103447n^5+112213n^4+58230n^3-226n^2-14237n-4715)(\alpha-w)^2}{32\phi\beta^2} > 0$.

The FTA formation creates the welfare gap between the two countries. When the firm enters country s_1 , country s_2 obtains the tariff revenues. However, country s_1 is better off than country s_2 due to undistorted, lower consumer prices.

4.3.3. Welfare effects when the FDI is located in a small non-member country, s_2

If the firm chooses to locate in country s_2 , surprisingly, the welfare of s_1 is better than that of country s_2 as shown in the follows:

$$dW_{s_1-s_2}^{MFN} = 0, \quad dW_{s_1-s_2}^{FTA} = \frac{n^2(7n^2 + 32n + 32)(\alpha - w)^2}{8\phi\beta} > 0.$$

This surprising result is due to the fact that country s_2 has to offer excessively high subsidies to induce FDI inflows. Eventually the welfare of the host country becomes lower than the welfare of a small member country which is importing goods from the host. Therefore, to induce FDI inflows might not be beneficial for a non-member country due to the strategic disadvantage in her tax competition with the FTA member countries.⁵

Proposition 4. Regardless of the location choice of the multinational firm, the welfare of the small country that joined the FTA is always better than the welfare of the external non-member small county. It might be welfare deteriorating for a non-member country to induce FDI inflows due to the strategic disadvantage in her tax competition for FDI inflows.

5. Policy implications and concluding remarks

We examined the impacts of preferential trade arrangements on a multinational firm's FDI location strategies and tax competition policies of asymmetric countries competing for FDI inflows. Based on a simple model where three asymmetric countries are competing for FDI inflows, we demonstrate that FTA formation provides a strategic advantage to a member country in the tax competition for FDI inflows. In addition, we show that when a small country form FTA with a large economy, the bargaining power of the small member country is improved significantly in comparison to MFN case in her tax competition for FDI inflows. Moreover, it is shown that it might be welfare deteriorating for a non-member country to induce FDI inflows by providing excess subsidies due to the strategic disadvantage.

These results provide several insights on the recent development of preferential trade arrangements where small open economies are very eager to form FTA or join to FTA with relatively large economies in Asia, Europe, and also in America. The results of this paper provide an answer for why South Korea has been so eager in arranging FTA with large economies as the United States, EU, and lately with China, mainly targeting for enhanced FDI inflows with the FTA arrangement. In addition, the results imply that the small economies are the major beneficiaries with increased FDI inflows from arranging PTA while increased geopolitical leverage is the major driving force for the large economies to pursue PTA arrangement. This finding explains why small economies are mainly driven by the expected economic benefits including FDI inflows from joining PTA.

While trying to determine the relationship between FTA formation and tax competition for FDI inflows focusing on the market asymmetry, important features as the technological asymmetries were not considered in this paper. Moreover, while focusing on the tax competitions among competing host countries, strategic interactions between multiple multinational corporations were not considered in this paper, either. To introduce the technology asymmetries and the strategic interactions among the multinational firms from various home countries would be the next step to extend our discussions to achieve more generalized understanding of our world with ever-evolving activities of multinational firms.

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⁵ This result is consistent with the argument made by Riezman and Kose (2002) that discusses the innocent bystander problem of the free trade agreement.